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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte TONGBI JIANG and EDWARD A. SCHROCK

Appeal 2010-002509
Application 09/483,712
Technology Center 2800

Before CARLA M. KRIVAK, THOMAS S. HAHN, and ELENI MANTIS
MERCADER, *Administrative Patent Judges*.

HAHN, *Administrative Patent Judge*.

DECISION ON APPEAL¹

Appellants invoke our review under 35 U.S.C. § 134(a) from the final rejection of claims 1-16 and 19. We have jurisdiction under 35 U.S.C. § 6(b). We affirm.

STATEMENT OF THE CASE²

¹ The two-month time period for filing an appeal or commencing a civil action, as recited in 37 C.F.R. § 1.304, or for filing a request for rehearing, as recited in 37 C.F.R. § 41.52, begins to run from the “MAIL DATE” (paper delivery mode) or the “NOTIFICATION DATE” (electronic delivery mode) shown on the PTOL-90A cover letter attached to this decision.

Appellants claim a structure for a semiconductor chip package. This structure includes at least one carrier bond, e.g., solder ball, attached to a conductive lead that is part of the structure. As also claimed, the “structure is free of an encapsulant material.”³ Claim 1 is illustrative:

1. An intermediate structure in the fabrication of a chip-scale package comprising:

a semiconductor die having an active surface having at least one bond pad thereon, sides and a back side;

at least one conductive lead frame member laterally spaced from the at least one bond pad and having an upper surface and a lower surface, the lower surface of the at least one conductive lead frame member having and [sic] inner end and an outer end and being substantially non-conductively attached to a portion of the active surface of the semiconductor die and vertically spaced therefrom by a non-coextensive dielectric element interposed there between;

at least one discrete conductive bond connecting the inner end of the at least one conductive lead frame member to the at least one bond pad on the active surface of the semiconductor die;

at least one carrier bond directly attached to the upper surface of the at least one conductive lead frame member at the outer end thereof and extending transversely thereto; and

wherein the intermediate structure is free of an encapsulant material to be subsequently applied to the intermediate structure.

Rejections

² We refer for respective details to Appellants’ Amended Appeal Brief, filed Aug. 25, 2008, (hereinafter App. Br.), the Examiner’s Answer, mailed July 11, 2007, (hereinafter Ans.), and the Reply Brief, filed, Sep. 10, 2007, (hereinafter Reply Br.). Further, we note that arguments not made by Appellants have not been considered and are deemed to be waived. *See* 37 C.F.R. § 41.37(c)(1)(vii).

³ *See generally* Spec. 6:13-10:21; Figs. 2-6.

The Examiner, under 35 U.S.C. § 103(a), rejected:

1. Claims 1, 2, 5-9, 13-16, and 19 as being unpatentable over King, U.S. Patent 5,677,566, and Havens, U.S. Patent Publication 2001/0011773 A1 (filed Mar. 25, 1999) (Ans. 3-6); and
2. Claims 3, 4, and 10-12 as being unpatentable over King, Havens, and Lee U.S. Patent 5,894,107 (Ans. 6-7).

Appellants' Contentions

Appellants group claims 1, 2, 5-9, 13, 15, 16, and 19, and collectively argue independent claims 1 and 2 for the group (App. Br. 6-13; Reply Br. 2-7). These two claims are contended to be patentable because the Examiner is asserted to have erred in finding disputed elements being taught or suggested from a combination of King and Havens. The disputed elements are a carrier bond directly attached to (claim 1) or disposed on (claim 2) a conductive lead frame *prior* to application of encapsulant material (App. Br. 9, 10).

Appellants separately argue dependent claim 14 is patentable (App. Br. 13, 14; Reply Br. 7, 8). In contradiction to the Examiner's finding, Appellants assert that King "does not teach or suggest use of a conductive or conductor filled polymer" for carrier bonds (Reply Br. 8).

ISSUES

Appellants' contentions present us with the following issues:

1. Does a combination of King and Havens, under § 103(a), teach or suggest a carrier bond arranged on a conductive lead frame prior to application of encapsulant material?
2. Does King, under § 103(a), teach or suggest use of conductive or conductor filled polymers for carrier bonds?

FINDINGS OF FACT

The following findings of fact (FF) are supported by a preponderance of evidence:

1. Havens discloses fabricating an electronic package 1 that includes a semiconductor chip 4 and conductors, or solder balls 6 for electrically coupling to an external circuit board. This electronic package 1 is subsequently immersed in a solution to apply a protective coating (¶ [0028]; Fig. 1).
2. Havens also discloses that “. . . solder balls 6 need not be applied to the package’s substrate before applying the protective coating. . . . [P]rotective covering is . . . selectively removed . . . so as to expose underlying bonding pads ‘P’ (see . . . FIGS. [8,] 1 and 1A) for subsequent solder ball 6 positioning . . . and coupling thereto” (¶ [0057]).
3. King discloses that “the electrodes [i.e., solder balls] may be ‘plated up’ using conventional plating techniques rather than formed using solder balls . . .” (col. 4, ll. 60-62).

PRINCIPLES OF LAW

An Examiner's articulated reasoning for a rejection must possess a rational underpinning to support the legal conclusion of obviousness. *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006). The Supreme Court has stated that "rejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.'" *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007) (quoting *Kahn*, 441 F.3d at 988). The Supreme Court further has stated that "[w]hen a work is available in one field of endeavor, design incentives and other market forces can prompt variations If a person of ordinary skill can implement a predictable variation, § 103 likely bars its patentability." *KSR*, 550 U.S. at 417.

ANALYSIS

Claims 1, 2, 5-9, 13, 15, 16, and 19

The Examiner acknowledges that "King does not teach an intermediate structure in which the carrier bond is attached to the upper surface of the lead frame member of the intermediate structure, wherein the intermediate structure is free of encapsulant material" (Ans. 7). Turning to Havens, though, the Examiner finds the reference "discloses [0025-0028] that an encapsulant . . . may be formed after applying the carrier bonds (solder balls 6) to the [electronic package] structure" (*id.*). We agree with and adopt the Examiner's finding (*accord* FF 1).

Appellants point out that Havens also teaches attaching solder balls 6 to electronic package 1 after applying encapsulant material (App. Br. 8;

accord FF 2). Relying on the alternative Havens disclosures for when to attach solder balls 6, Appellants contend King and Havens fail to “teach or suggest the desirability of attaching the carrier bonds before applying the hermetic covering as opposed to attaching the carrier bonds after applying the hermetic covering” (App. Br. 9, 10).

In the Examiner’s “Response to Argument” section of the Examiner’s Answer, it is explained that:

[I]f King encapsulated the package before forming the carrier bonds, subsequent processes would have to be performed such as drilling or etching holes into the hardened encapsulant, and then attaching the carrier bonds to the leads of the structure through the encapsulant, thus adding process steps and ultimately NOT facilitating shipment of the completed package. It’s a very simple concept and an additional motivation for forming the carrier bonds on the intermediate structure prior to encapsulation. The point is that Havens . . . teaches that the carrier bonds are formed prior to the encapsulation process, that the intermediate structure is free of subsequent encapsulant, and that it is desirable to form the package in such a manner.

(Ans. 9, 10.) We agree with the Examiner’s articulated reasoning, which is based on at least the rational underpinning that removing cured encapsulant to attach carrier bonds would be recognized by an ordinarily skilled artisan as adding processing steps. Therefore, we are persuaded by the Examiner that modifying King with Havens’ teachings for attaching carrier bonds prior to applying encapsulant material is an obvious variation. *See also KSR*, 550 U.S. at 417 (“[W]hen a patent [claim] ‘simply arranges old elements with each performing the same function it had been known to perform’ and yields no more than one would expect from such an arrangement, the combination is obvious.” (quoting *Sakraida v. Ag Pro, Inc.*, 425 U.S. 273, 282 (1976))).

Appellants substantively continue with the same arguments in the Reply Brief as to the Examiner erring in combining King and Havens (Reply Br. 3-7). We do not find these arguments to be persuasive as discussed *supra*.

For the foregoing reasons, we are not persuaded that the Examiner erred in rejecting independent claims 1 and 2. We will sustain the rejection of claims 1 and 2, and will also sustain the rejection of dependent claims 5-9, 13, 15, 16, and 19 that fall for the same reasons.

Claim 14

Dependent claim 14 recites that the “conductive carrier bonds comprise[] a conductive or conductor-filled polymer.”

The Examiner finds “King additionally states (col. 4, lines 60-65) that the carrier bonds (external electrodes/solder balls 38) may be formed by processes other than those used for forming solder balls (which would include forming a conductive or conductor-filled polymer)” (Ans. 11; *accord* FF 3).

Appellants argue that “[a]lthough King et al. mentions the possible existence of other processes that may be used to form the external electrodes, it does not teach or suggest use of a conductive or conductor filled polymer” (Reply Br. 8).

Based on the record, we deduce that the Examiner substantively finds functional equivalence between electrical conductor solder ball structures and conductive or conductor-filled polymers. We agree with the Examiner. We so find because King teaches that variations from solder balls that are available to ordinarily skilled artisans are usable (FF 3). Commensurately, we do not find persuasive argument or evidence in the record that an

ordinarily skilled artisan would be unable to implement conductive or conductor filled polymers as a variation for solder balls, or would be unable to recognize that such a variation would provide a predictable result. Accordingly, we conclude that the record presents a predictable variation that an ordinarily skilled artisan can implement, which as a result bars patentability. *KSR*, 550 U.S. at 417.

For the foregoing reasons, we are not persuaded that the Examiner erred in rejecting claim 14. We will sustain the rejection of claim 14.

Claims 3, 4, and 10-12

Appellants rely on the arguments asserted for base independent claim 2 in asserting that these claims are patentable (App. Br. 14, 15; Reply Br. 8, 9). For the reasons explained *supra*, we are not persuaded by Appellants' arguments. Consequently, Appellants additional assertion that Lee fails to cure King and Havens contended failures is unavailing because we do not find the combination of King with Havens to be deficient.

We will sustain the rejection of claims 3, 4, and 10-12.

ORDER

The Examiner's decision rejecting claims 1-16 and 19 is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(v).

AFFIRMED

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gvw

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